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Joint Editors
U. Baliol Scott R. Bruce Dunfield

News Editor A. G. Thomson
Assistant Editor R. Bowran

Display Advertisement Manager
E. S. Hooper

Circulation
Robert Budd

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Difficult Questions for the I.T.C.

WHEN the International Tin Agreement was finally brought into existence, there were those who argued that it came into being just at the time when it ceased to be necessary. Certainly it then appeared that the rise in world consumption, coupled with the stagnation in world production, seemed likely, within two years, to turn a surplus into a shortfall.

How far that position has now changed was made clear at the recent meeting of the International Tin Council, which has revised upward its estimate of the world's surplus for this year from 6,000 to 12,500 tons. The view has been expressed that it might even have to be revised upward yet again.

Whether world consumption of tin will even off, or perhaps drop, depends almost entirely on whether the United States is moving, as a number of economists think, into a recession. If that were to happen then the outlook for tin would be bleak indeed. Even in present circumstances, tinplate is becoming harder to sell. A part of this difficulty can be traced to the desire of tinplate users to run down their stocks, both in the desire for a lower price, and because of the high cost of financing them at present money rates. Sooner or later these users will be forced back into the market, but there is no doubt that they will hold off as long as they can and there may be a bout of price-cutting before they are enticed. On October 24, United Steel Corporation reduced its prices to eliminate export premiums altogether. Japan is also reported as having sliced margins appreciably to get business in the Far East. Good market research may help the tin industry to estimate how far it might suffer, given certain percentage declines in the gross national product of the United States, and this danger should be assessable.

The other difficulty facing the industry is more difficult to get to grips with. How much tin will the Russians sell this year? There are two ways of looking at this problem. On the one hand there is the avowed Russian intention of raising standards of living inside the U.S.S.R.; this cannot be done without increasing tinplate consumption. It is probably impossible for the Russian leaders to turn back on this intention, but they may well be forced to slow down the rate of fulfilling it.

On the other hand, for political reasons, in the Middle East and Far East particularly, the Russians are giving long-term credits which are, in effect, unrequited exports. In so far as these exports might elsewhere have earned foreign currency, Russia is forced to turn to other commodities to secure necessary foreign exchange. Furthermore, if, as seems likely, the Western World is running short of capital to finance development in Africa and Asia, Russia will be under much greater pressure to step into the breach. Again, for political reasons, she will be forced to offer credits to the very limit of her capacity to do so.

Thus there will be twin forces at work; one making for the export of currency-earning commodities, e.g., tin, and one making for restraint in domestic consumption, as far as this is politically possible, and this will restrain the growth of the tinplate industry.

One further factor should not be overlooked. In the United Nations and in its subsidiary committees, Russia has always taken

the side of the under-developed countries in discussions on commodity stabilization problems. She has commonly expressed opposition on principle to the type of commodity stabilization agreement represented by the I.T.A. Again, therefore, there are political motives for making it difficult to operate the Agreement. Especially, when as is obvious, in times of stress the producer and consumer countries take different points of view. On the whole, therefore, one would expect that exports of tin from Russia—impossible during three months of the year owing to ice-bound ports—will continue so long as the market is depressed, or so long as they make it difficult for the Agreement to operate. This is not an optimistic outlook, but it is, at least, a very likely one.

PHOSPHATES AND POTASH IN ISRAEL

After a recent visit to Israel of leading representatives of Japanese mining concerns, a delegation from Italy has spent three weeks in the country advising the Israel Mining Corporation on techniques of enriching the phosphates mined in the Oron district. There are prospects that Italian firms will participate in a I£500,000 survey of phosphate deposits in the Negev area and share in exploitation of Southern Negev deposits. At the same time, it is learned that an Italian businessman is negotiating with the Dead Sea Potash and Bromine Works for the purchase of large quantities of potash and bromine for the Italian market.

An increase of 31.5 per cent in phosphate production during the six months April - October—as compared with the same period last year—has been officially announced, the total amounting to 75,000 tons (1956 : 57,000 tons). The Ministry of Development stated that production now averaged about 17,000 tons per month. Exports in September, 1957, were 7,700 tons to the value f.o.b. $85,000. Transportation from Oron in the Negev to Haifa port costs I£11 per ton

The Director of the Geological Institute attached to the Ministry of Development has revealed that potash in concentration five times as great as that in the waters of the Dead Sea has now been found in an artesian well discovered in the course of oil-drilling operations in the Mount Sodom district. The artesian water also contains 20 per cent more bromium than the Dead Sea waters, as well as 430 grams of salts per litre—the highest concentration so far known. The potassium chloride content is 50 grams per litre, against 12 grams per litre in the Dead Sea itself. The Geological Institute is investigating the possibility of commercial exploitation.

Potash output at the Dead Sea works plant, Sodom, increased from 6,950 tons in August to the record figure of 7,800 tons in September this year. During the record month, a daily output of 357 tons was achieved.

BRITAIN'S IRON ORE RESOURCES

The architects of the British steel industry need to be long sighted. At the moment, financial problems obtrude. The formidable problem of financing a five-year development plant at an estimated capital cost of £600,000,000 has become more perplexing since the rise in the Bank Rate.

These are not the only problems confronting the industry. In the current issue of *Steel Review*, the official publication of the British Iron and Steel Federation, a detailed examination has been undertaken of the capacity of the small group of engineering companies that specialize in building the industry's massive and complex equipment.

On the whole, the results of the analysis are moderately reassuring. Our engineers are better able than formerly to meet the requirements of the third steel development programme, without extraneous aid. There will be less need than formerly to buy plant and machinery "off the shelf" from U.S.A., and to that extent the strain on our dollar reserves will be reduced. But the fact remains that at no period since the end of the Second World War has the industry been able to install as much new plant as was desired, and in many directions the plans for expansion are exposed to risks of delay and frustration.

Fulfilment of these plans, moreover, is not alone contingent upon the optimum performance of the plant builders. To raise the output of pig iron and steel ingots to 20,000,000 and 29,000,000 tons respectively in 1962 will call for enormously increased supplies of home and imported ores. In 1938 our total ore usage was 16,100,000 tons; last year it had risen to 30,000,000 tons and requirements in 1962 are estimated by the Iron and Steel Board to amount to not less than 43,000,000 and possibly 45,000,000 tons, in about equal proportions.

The steps taken to increase the intake of foreign ores, the extension of the supply lines, the provision of more ore carriers and of handling facilities at the ports of loading and discharge, have already been described in some detail. The current number of *Steel Review* now surveys the progress in the development of British iron ore resources and the large-scale expenditure of effort and capital required to implement new schemes in contemplation.

The first year of home ore production was 1942 when total winnings amounted to 19,900,000 tons. This, of course, was under the compulsion of war. Easily won deposits intended for long-term exploitation had to be raided. Twice the present labour force had to be employed, but that rate of extraction could not be maintained and, in fact, has never since been equalled.

Now a still higher target has been fixed and as the older deposits approach exhaustion, the leaner ore beds ranging from the Humber to the Severn have been developed. The extent of these developments is not adequately indicated by the movement of the figures of total U.K. ore production, since the growth of output in the new areas is measured by the loss of output in the older fields.

Looking forward, the steel industry's development plans envisage the further expansion of home ore production from 16,200,000 tons in 1956 to 23,000,000 tons in 1962 and nearly all this expansion is being undertaken by the companies which produce their own pig iron, and it is suggested that the ore beds already under lease should be reserved for the maintenance and development of the iron and steel works already associated with them.

The Geological Survey has selected the Northampton sand ironstone bed to the north of the Welland as the most promising area in which such development should be centred, and since both the reserves in the western section of this deposit and those already under lease in the eastern section are fully required to sustain production at the associated iron and steel works, further development would have to be concentrated on free resources on the eastern side.

To justify the building of a new integrated iron and steel works in close proximity, these free resources would need to meet the requirements of a plant with a minimum steel capacity of 1,000,000 tons per annum—say 3,500,000 tons of ore.

Whether the deposits are large enough to assure supplies of ore of this magnitude over a long period of years has yet to be determined. A major campaign will be required to prove the location, quantity and quality of the ore before

any decisions on the practicability and siting of the new works can be reached.

On optimistic assumptions it is calculated that some ten years would be required to bring a new integrated iron and steel works on the ore field into operation, and some fifteen years to bring it into full production. Two major steel companies—Stewarts and Lloyds, and the United Steel Co. —have indicated their willingness to conduct these extractions north of the Welland, and if the results are satisfactory, to develop this new source of supply.

If this be the ultimate outcome ore production in the U.K. could rise to 20,000,000 or even 30,000,000 tons in the later sixties. At such a level the home ore industry would be operating at what geological experts believe to be the maximum maintainable rate of production.

MINERALS POLICY IN BURMA

Burma's new and encouraging attitude towards foreign investment in its mining industry was stressed by Mr. U. Win, Burmese Ambassador to the United States, at a recent meeting of representatives of the U.S. mining industry with officials of the U.S. Department of Commerce. The meeting was arranged by the Far Eastern Division of the Department's Bureau of Foreign Commerce as part of its programme for stimulating interest on the part of American enterprise in investment abroad.

The Ambassador stated that the Burmese Government had recently adopted several measures to attract foreign mining enterprise. These include tax concessions, guarantees against nationalization, and preferential treatment for imports of capital equipment. New mining regulations designed to encourage foreign investment had been adopted, said Mr. U. Win, and the government was taking firm steps to improve security conditions in the country.

Dr. Roy T. Wise, minerals member of the first U.S. Trade mission to Burma in March this year, told the meeting of the great interest expressed by the Government of Burma and Burmese mineowners in obtaining U.S. capital and technical assistance in developing the country's mineral deposits. Stressing the insufficiency of available data on the extent and location of ore deposits, he proposed a co-operative industry-wide exploration of the country's promising potentials, which include tin, tungsten, lead, silver, nickel, manganese, quartz, chromite and mica, to determine the extent to which U.S. firms might be willing to participate in their development.

Concern was expressed at the meeting over the problems of insurgency, inadequate transportation, and power facilities, but it was emphasized that great strides were being made in overcoming them. In further discussion it was pointed out that railway and port facilities at Rangoon were being improved under loans recently granted by the International Bank for Reconstruction and Development, and that in the near future Burma would have adequate hydro-electric resources, which could be utilized in mining.

The U.S. mission to Burma earlier this year and the meeting organized by the Bureau of Foreign Commerce are indicative of anxiety to secure for future U.S. requirements supplies of minerals which are bound to become increasingly rare, as well as to follow up opportunities for profitable investment throughout the Free World.

Interest in Burmese minerals, of course, is far from being confined to the U.S. Before the Second World War British enterprise was closely identified with the development of Burma's mineral wealth, and since the resumption of mining activities it has continued to play a key part in the rehabilitation of the industry, in which, despite the many difficulties of the post-war years, encouraging progress has been achieved. Thus the reconstituted Burma Corporation — now jointly controlled by Burma Mines and the Burma Government—has been expanding its operations, while tin producers have gradually been resuming operations as circumstances permit.

It is noteworthy that an aerial survey contract to photograph 200,000 sq. miles of territory in Burma has just been won by Fairey Air Surveys Ltd., of London (a subsidiary of the Fairey Aviation Co. Ltd.) and its associated company, Air Survey Co. of India (Pte.) Ltd. Covering virtually the whole of Burma, this is believed to be the largest single contract ever to be signed between a government and a private firm for aerial photography and is valued at £200,000. It was won in competition with companies from Canada, France, Germany, Israel, Japan and the U.S. Apart from aerial photography, the companies have also undertaken to train members of the Department of Survey and the Burma Air Force in the details of field and flight operation of aerial photography.

Among other countries interested in the Burma Government's efforts to create a climate favourable for mining investment is Yugoslavia, which is already participating in the search for mineral wealth.

NEW D.S.I.R. RESEARCH STATION

The Research Council of the Department of Scientific and Industrial Research has decided to replace the present Fuel Research Station at Greenwich, where it would be uneconomic to spend more money on the buildings, by a new establishment at Greenwich.

The state of fuel research in Great Britain has changed a great deal since the Fuel Research Station was set up in 1917. At that time there was need for a station to cover the whole field of research on solid, liquid and gaseous fuels. Since then, the work of the Fuel Research Station, in opening up the field and in pointing the way for further work, has led to the growth of other organizations for research on fuels. To-day, apart from the Fuel Research Station and the activities of both industrial firms and some universities, fuel research in the U.K. is carried out by some ten organizations which include the National Coal Board, and the Safety in Mines Research Establishment.

It has consequently been decided that of the researches currently being undertaken at Greenwich, only work on atmospheric pollution and its prevention and on the synthesis of carbon monoxide and hydrogen will be transferred to Stevenage. The new station at Stevenage will be available to carry out any other investigations in the field of research which the national interest may require. Its work will not be confined to the field of fuel research, but will include any other selected investigations requiring staff and facilities of the kind necessarily to be provided for fuel research.

An example of this new kind of work is afforded by mineral processing research. The need for such research is summarised by the Department as: (1) the increasing demand for metals against a diminishing supply of rich ores, with a consequent need to examine new methods for the treatment of low grade complex ores; and (2) the growing demand for some of the less common metals for such developments as those of atomic energy and the jet engine.

The estimated cost of the new station, including the site, is of the order of £750,000. Work on the site has already begun and it is hoped to start occupation in the autumn of 1958 and to complete the station in the spring of 1959.

Exploitation of India's Mineral Resources

THE construction of steel plants in India to be set up in the public sector and the expansion undertaken by the existing units is proceeding according to schedule. Production of iron at the Bhilai plant is expected at the end of 1958 and of steel by the end of 1959. At the Roukela steel plant the first blast furnace is scheduled to start production before the end of 1958 and the steel rolling mills will be commissioned six months later. Output from the Durgapur steel plant will follow soon after the first two plants are in operation.

Non-Ferrous Imports

From the trade statistics of five principal non-ferrous metals, it appears that on an average India has been importing these metals to the value of Rs.20-25 crores every year. The contemplated development in engineering, chemical and other consuming industries in the Second Plan period will lead to a substantial increase in the consumption of non-ferrous metals. Unless indigenous production keeps pace with consumption, this would lead to a heavy expenditure of foreign exchange. The total consumption of non-ferrous metals is expected to rise in value from Rs.29 crores in 1955-56 to Rs.41 crores in 1960-61, while indigenous production of metals in 1955-56 amounted in value to Rs.6 crores. Thus the gap to be covered is large indeed.

The development of non-ferrous metal industries should ideally be based on domestic mineral resources. Due to the vastness of the country and to the lack of trained staff and equipment, large areas still await systematic exploration.

Aluminium

Aluminium is the only major non-ferrous metal in respect of which India has extensive known ore deposits. The country's total known reserves of bauxite are estimated at 250,000,000 tons of all grades. Out of these, it is estimated that about 27,000,000 tons are of high grade suitable for the production of metal. It is believed, however, that in due course modern technological processes will allow lower grade material to be used for the manufacture of alumina and aluminium. The bauxite deposits, besides being large, are fairly widely distributed. Moreover, geological strata in different parts of the country appear favourable for the discovery of further deposits.

There are two concerns currently producing aluminium in India and at present their combined installed capacity is about 7,500 tons a year. The current requirement of alu-

India's Second Five-Year Plan has been described as an effort to raise the country's very low standard of living by democratic means. Because of the ambitious programme attempted and the shift of accent from agriculture to industrial development, the national economy is at present being seriously overstrained. It is hoped, however, that by the end of next year the completion of major projects now under construction will greatly improve the balance of trade. This article sets out the position of the mineral and base metal industries in relation to the increasing requirements of the Second Plan. It is based largely on a series of authoritative surveys published by "The Eastern Metals Review" in a special number commemorating the tenth anniversary of India's attainment of Independence on August 15, 1947.

On the opposite page is shown the Kandri Mine, while alongside is the Munsar Mine. Both these mines are in the Nagpur District, Bombay State. Below, right, is the heavy-media separation plant at the Dongri Mine in the Bhandara District of Bombay State. Photographs are by courtesy of Central Provinces Manganese Ore Co. Ltd.

minium in various forms is estimated at about 25,000 tons per year and by the end of the Second Five-Year Plan period aluminium demand will be 35,000 to 40,000 tons. A production target of 40,000 tons has been set, but this is regarded as a minimum and may be suitably revised in the light of increasing demand. To achieve the production capacity of 40,000 tons per annum, two licences have so far been issued; one for a new unit of 10,000 tons at Hirakud and another for expansion of an existing unit to 5,000 tons.

A committee of experts, set up to advise the government on suitable sites for new aluminium smelters and the minimum size of such smelters, has recommended that two smelters, each of 10,000 tons capacity with facilities for expansion up to 20,000 tons, should be established, and Mettur and the Rihand Dam are being proposed as suitable sites. It is expected that one of these smelters will come into operation during the Second Plan period and the other early in the Third Plan period.

Other Metals

Known workable deposits of copper ore are confined to the Singhbhum copper belt in Bihar. India is not, therefore, very fortunately placed in this respect and only one unit is producing copper ore. Annual production is about 7,200 tons per annum, while demand has been estimated at between 25,000 and 30,000 tons per annum. There is thus a very wide gap to be filled.

The indigenous production of copper is mainly used for the manufacture of brass and other copper base alloys. There is an urgent necessity for a refinery to manufacture high conductivity copper suitable for the electrical industries. A scheme has been submitted for an electrolytic refinery in Rajasthan and another for a refinery of more than 10,000 tons capacity. The Indian Copper Corporation—the country's sole copper producer—has put forward a scheme for an electrolytic refinery.

Occurrences of copper ore have been reported in various districts, and the areas in question are to be systematically examined by the government.

The position of the lead industry is not very different from that of copper. Although a number of scattered occurrences have been reported, the only commercially exploitable deposits are the lead/zinc ores of the Zawar mines near Udaipur in Rajasthan, which are worked by the Metal Corporation of India. Present production of lead in India is about 2,400 tons per year. Demand appears to be of the order of 10,000-12,000 tons, but it is increasing very rapidly and by the end of the Second Plan period may well have reached 20,000 tons. It is expected that by the end of this year the existing producer will be operating its lead smelter at a capacity of 6,000 tons of lead.

No zinc metal is at present being produced in India, the zinc concentrates from the Zawar mines being exported. Annual production of concentrates containing about 50-54 per cent zinc is of the order of 6,800 tons, but will be raised by the end of the current year to about 12,000 tons.

Present demand for zinc is about 35,000-40,000 tons per year and is likely to rise up to 50,000 tons by the end of 1960-61. The Metal Corporation of India is now implementing a programme at the Zawar mines designed to raise 1,000 tons of ore a day, which would be sufficient to feed a zinc refinery of 10,000-12,000 tons per annum. It is expected that this refinery will come into operation by 1960-61, coincident with the availability of electric power from Chambal Hydroelectric Scheme.

India's antimony smelting unit has an installed capacity of 1,000 tons per annum, which is more than sufficient to meet the present demand estimated at about 600 tons and the projected one by 1960-61 of 800/1,000 tons. This unit was established, however, on the basis of supplies of antimony ore from Chitral. Since no other workable deposits have been discovered, it has to be supplied with ores imported from abroad. The main problem of the antimony industry is thus the availability of ore and various promising areas are being surveyed.

Exports of Mineral Products

In 1956, India's earnings from exports amounted to Rs.588 crores, to which the mineral trade contributed about Rs.50 crores. In the first half of the current year there were increased shipments of manganese, mica and iron ore. Exports of kyanite are rising very steeply.

Government policy seeks to foster, as far as possible, the processing of minerals or ores within the country in preference to their export in the form of raw materials. Already, beneficiation of manganese ore and the manufac-

ture of iron and steel, aluminium, ferrochrome and ferro-manganese have been started, or are being started. At present these products are mainly for internal consumption.

In determining the quantities of a particular mineral for which export can be sanctioned, the government will, therefore, take into account not only the available reserves and their location in relation to transport facilities, but also domestic requirements in the foreseeable future. As an example of this changed approach, Mr. M. C. Basu, of the Indian Bureau of Mines, points out that India's present internal consumption of chromite is about 15,000 tons a year and 35,000 tons are exported, but the ceiling for export is 75,000 tons. The estimated reserve is 1,300,000 tons, which would last for 26 years at the present rate of consumption. There have been proposals, however, for the establishment of ferrochrome factories. If these materialize the existing export ceiling would have to be revised downwards. Thus, no long-term contract for export of chromite on the present basis should be entertained. On the other hand minerals or ores which occur in very large quantities—such as iron ore, bauxite, manganese, etc.—may be negotiated for long-term contracts.

Mr. Basu concludes his discussion of India's export trade with a few observations on the quality and grade of products. India occupies a place of honour in certain minerals, e.g. mica and manganese. "One very important way of pushing up export trade", he states, "would be to standardize our products and strictly and honestly adhere to it. Unfortunately, our mineral trade has not earned any good name in this respect. Indian Standard Institute (I.S.I.) has made a good beginning and it is hoped that ere long Indian products will achieve world recognition for high standard and quality".

India is fortunate in having vast deposits of high and low grades of manganese ore, wrote B. C. Kar and T. Banerjee, of the National Metallurgical Laboratory, Jamshedpur, in a paper delivered to the Indian Institute of Metals in December, 1956. High-grade ores, mined to the extent of more than 1,000,000 tons per annum, are chiefly exported. An approximately equal amount of unmarketable low-grade ores, which might in the future be amenable to beneficiation, is being dumped at the mine face every year. Intensive investigations have already been undertaken at the National Metallurgical Laboratory to utilize low-grade manganese ores by ore dressing and thermal beneficiation, and also by producing electrolytic manganese. Electrolytic manganese, produced on a semi-pilot plant scale, is now being used on different research projects, particularly for making special alloy steels.

Swedish Government Takes Over Lapland Mines

SWEDEN'S large Arctic iron-ore mining company, Luossavaara-Kiirunavaara AB (LKAB), passed into government hands on October 1, when the previous holder of LKAB's ordinary shares, the Grängesberg Co., received a cheque for Kr.165,000,000 as a first instalment of the Kr.825,000,000 to be reimbursed by October 1, 1961.

Grängesberg will retain a parcel of about 21,250 shares with a face value of approximately Kr.21,500,000—and a book value of about Kr.100,000,000—or 4.25 per cent of the share capital of LKAB, which was raised from Kr.110,000,000 to Kr.500,000,000 on October 1. Besides this, LKAB and Grängesberg will be partners, in equal proportions, in a joint sales company, AB Malmexport, while they will also continue to collaborate in the field of ore shipments.

LKAB, which has its head office in Stockholm, operates iron-ore mines at Kiruna and Malmberget above the Arctic Circle and has harbour administrations in the shipping ports of Lulea, on the Gulf of Bothnia, and Narvik, Norway. Last year's output totalled 13,800,000 tons of iron ore. Exports amounted to 12,900,000 tons. Of this quantity, Western Germany purchased 5,800,000 tons, Belgium-Luxembourg 3,000,000 tons, Great Britain 2,600,000 tons, the United States 1,000,000 tons and Poland 400,000 tons.

In 1956, LKAB and its subsidiary, Bergverks AB Freja, employed 7,500 persons. The net profit on mining operations was Kr.179,700,000 for the accounting year October 1, 1955 - September 30, 1956. The government, then holders of the preference shares only, obtained Kr.108,500,000 in dividends, while Grängesberg received Kr.71,100,000. Taxes paid amounted to about Kr.220,000,000.

Flood lighting on the slopes and terraces of Kiirunavaara. In the foreground are the Luossavaara sorting plant, Lake Luossajarvi and the railway

METHANE is now being piped from Wolstanton Colliery to the Etruria Gas Works, Stoke-on-Trent. Next year it will also be supplied to the same gas works from Holditch Colliery. Provision exists for the extension of the scheme to other North Staffordshire collieries as circumstances permit. In time it is expected that the yield of methane from the North Staffordshire coalfield as a whole will be considerable.

In the first stage the intention is to give a minimum supply from the two collieries equivalent to 5,000,000 cu. ft. a week of pure methane. Since the calorific value of 100 per cent methane is twice that of the same volume of gas made by carbonizing coal, this will equal 10,000,000 cu. ft. of coal gas. The arrangements are flexible so as to meet the variations of supply to which a natural gas is subject.

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Colliery Methane

Successful use of methane from collieries for this purpose has been made on a limited scale in other British coalfields but this is the first scheme in the Midlands. It has been made possible by the development in post-war years of techniques for the systematic drainage of methane from collieries, where it is present in appreciable quantities.

While the gas drawn off in this way has been applied in a number of cases to the heating of colliery boiler plants (as at present at Stafford Colliery) thus directly saving coal, much of it has merely been discharged into the air on the surface. The primary object of removing the gas from the pits has always been that of safety, but this joint enterprise by the two Boards enables a safety measure to be combined with a beneficial use of a valuable natural fuel.

It was realized a long time ago—even before 1800—that it would be advantageous if means could be found to extract methane from the strata in advance of, or during, the working of coal, instead of carrying it away in the ventilation airstream. Work has been carried out on the Continent and in this country but only in recent years has systematic drainage of methane been successfully applied. To-day, drainage is practised to some extent at more than 40 collieries in Great Britain.

Four schemes for the drainage of methane have been, or are being, undertaken in North Staffordshire. The first of these began at Stafford Colliery in 1950, and was developed in the Bowling Alley seam, one of high quality. The gas, which is still being drained seven years later, has been used for firing boilers and in an experimental gas turbine for generating electricity. It will soon be augmented by supplies from Hem Heath Colliery, where drainage is also being applied successfully.

In addition to the supply which is being obtained from Wolstanton Colliery, the Coal Board will make available in about mid-1958 to the West Midlands Gas Board gas drained from Holditch. As these collieries are enlarged under the development plans for North Staffordshire, increasing quantities of gas may be available.

Several methods of drainage have been developed for various conditions. Two are used in North Staffordshire: draining gas from the goaves of worked-out areas, and what is known as the cross-measure borehole method. Draining from old goaves involves the erection, at the entrances to the worked-out districts, of controlled pressure chambers, through which the methane is drawn in pipes at rates appropriate to the production of methane and variations in barometric pressure. The cross-measure borehole method consists of boring holes 2 in. to 3 in. in dia. and up to 300 ft. long at an angle upwards, sometimes behind and sometimes in front of the working coal face and sometimes downwards from the roadways leading to the coal face.

Some of the methane gas extracted from local mine workings is now being used instead of coal to provide a part of the ordinary gas supply for homes and industry in the Stoke-on-Trent district. This is the first stage of a joint scheme by which methane gas drawn from certain North Staffordshire collieries of the West Midlands Divisional Coal Board is taken by the West Midlands Gas Board and mixed at their works with gas made in the usual way. The scheme, which results from close collaboration between the two Boards, was officially inaugurated on October 28. By the middle of next year, it is expected to save about 1,000 tons of coal a week.

For a Gas Board

These boreholes and also the pipes leading from the controlled pressure chambers are connected to a range of pipes which carry the gas to the pit-bottom and thence up the shaft to the surface. The flow of gas is helped, when necessary, by suction pumps.

Where demand for town's gas is high—as in the Potteries—and where circumstances make it possible to supply methane from the collieries to the local Gas Board, this form of utilization may be the best. Other purposes for which methane can be economically employed are:

(a) For firing ordinary colliery boilers (as hitherto at Stafford Colliery). This is sometimes a useful short-term outlet but will have a decreasing application with the electrification of colliery plant;

(b) For pit head generation of electricity or compressed air by gas turbine. There is an experimental installation, originally sponsored by the Ministry of Power, at Stafford Colliery. This process is attractive in certain circumstances.

Methane can also be compressed into bottles for use by road vehicles and for other purposes; and it may possibly be used by the chemical industry for conversion into various products. The future depends very largely on the extent of the natural resources. With this important qualification, the West Midlands Divisional Coal Board intend, as part of their general plan for developing the North Staffordshire coalfield, to drain methane from the four collieries already mentioned and also from Chatterley-Whitfield. They will collaborate closely with the West Midlands Gas Board in the fulfilment of this intention.

Aluminium In

AN abundant and cheap source of energy is necessary for the production of aluminium. In the more highly industrialized countries—particularly those of Europe—electrical power is scarce and costly. There is thus a tendency for the production of primary aluminium to gravitate towards those under-developed regions where abundant hydro-electric power can be made available at low cost. It is partly for this reason that the aluminium industry is now becoming established in Africa, and also because of the existence of extensive bauxite reserves in various localities.

If all the projects now being studied were fully implemented, Africa could, within ten years, supply the following quantities of aluminium:

Cameroons	45,000 tonnes
French Guinea	200,000 tonnes
Middle Congo	200,000 tonnes
Ghana	210,000 tonnes
Total	655,000 tonnes

The Belgian Congo could also become an important producer of aluminium, but the enormous potentialities of the Inga scheme are outside the scope of the present article.

The transformation of bauxite into alumina does not demand large quantities of electrical power. In France the production of a tonne of alumina from ore requires 2 tonnes of bauxite, 2 tonnes of coal, 60 - 100 kgs. of caustic soda, 300 - 400 KWh. and 40 cu. m. of water.

On the other hand, the transformation by electrolysis of alumina into aluminium calls for 20,000 kWh. per tonne of aluminium of 99.5 per cent grade. The refining of aluminium from 99.5 per cent to 99.995 per cent purity requires 17,000 kWh. per tonne of refined metal.

In the various African territories where an aluminium industry is established or projected, the prospects of abundant supplies of low-cost energy are as follows:

Country	*Power potential (in 1,000,000,000 of kWh/year)*	*Cost per kWh (in Belgian francs)*
Cameroons: Edea	1.2	0.12
French Guinea: Konkouré...	5.1	0.22
Middle Congo: Kouilou ...	6.5	0.09
Ghana: Volta River—		
1st phase	5.2	0.22
2nd phase	5.2	0.14
3rd phase	5.2	0.12

These costs should be low enough to allow aluminium produced in Africa to compete on the world market with metal from reduction plants in the United States and Canada.

Aluminium in the Cameroons

Edea, on the Sanaga river, is situated 70 km. from Douala, with which it is linked by rail. The Sanaga has a summer flow of 350 cu. m., which is, however, of short duration. From June to February the flow is about 700 cu. m. A hydro-electric station with barrage has been constructed on a flow of 24 m.

This survey of aluminium projects in French Africa is based on an article by Louis Henin, which was originally prepared for Symétain. It was written before the recent announcement that British Aluminium is to be a member of two new international groups to be formed to build a dam and an aluminium works, respectively, on the River Konkouré in French Guinea. Financial information is given in French francs.

Originally, it was proposed to install two plants of 10,000 kW. each using 55 cu. m., with a similar standby plant. The transmission line between Edea and Douala, designed for a load of 90 kV., is actually functioning at under 60 kV. This scheme was completed in June, 1953. The annual output is 320,000,000 kWh.

In accordance with the project to utilize power produced at Edea for the establishment of an aluminium reduction works, the central power station is being enlarged. When contracts now in progress have been completed, it will comprise eight plants of 10,000 kW., of which one will be stand-by. The flow through the turbines will be $7 \times 55 = 385$ cu. m., which is assured during more than 8,000 hours per year. Output capacity will be 1,200,000,000 kWh. per year.

For the construction of the original power station of 20,000 kW., the Caisse Central de la France d'Outremer agreed to an advance of Frs.6,000,000,000, repayable in 50 years at 2.5 per cent. When the Péchiney-Ugine group resolved to take advantage of the possibilities of cheap power offered at Edea to establish an aluminium reduction plant, it was decided to undertake the necessary work to raise the capacity of the central station from 20,000 to 70,000 kW. The sum available from the Bank was raised to Frs.23,000,000,000, of which Frs.7,000,000,000 are for enlargement of the central power station and the balance for the electrolytic aluminium reduction works.

Alucam was formed by Péchiney and Ugine in 1954 to build the Edea plant. It has a capital of Frs.10,000,000,000, which is owned as follows: Péchiney 65.6 per cent, Ugine 16.4 per cent, Caisse Centrale de la France d'Outremer 10 per cent, and the territory of Cameroons 8 per cent.

Alucam is expected to produce 10,000 tonnes of aluminium in 1957, 30,000 - 35,000 tonnes in 1958 and 45,000 from 1959 onwards, consuming 900,000,000 kW. The alumina will come from France until it can be produced at Fria, in French Guinea.

The Syndicat Belge de l'Aluminium has obtained a participation in Alucam by acquiring 10 per cent of the capital and, in addition, guaranteeing a loan of Frs.6,000,000,000 from the Caisse Centrale. The Syndicat Belge has also concluded agreements with Péchiney-Ugine, under which it will obtain from the latter group the alumina required, with the right to give to Alucam for processing quantities corresponding more or less to 11 per cent of Edea capacity.

Aluminium in French Guinea

Important reserves of bauxite, of which 200,000,000-300,000,000 tonnes are proved, have been discovered in the region of Boke in the north of French Guinea and near Fria, in the proximity of the Konkouré river and 145 km. north-east of the port of Conakry.

Following these discoveries, and taking into account the existence of suitable sites for hydro-electric undertakings on the Konkouré and Kouilou rivers, the French aluminium producers, in collaboration with certain foreign producers, decided to establish in French Guinea initially the production of alumina from bauxite and ultimately the electrolytic reduction of alumina to aluminium.

French Africa

The Boke concession belongs to Aluminium Ltd. of Canada through its French subsidiary, Les Bauxites du Midi. The latter company proposes to extract 1,500,000 tonnes of bauxite a year, which will be added to the 300,000 tonnes already produced by the same company in the Iles de Loos. A million tons of bauxite will be shipped to Canada and 500,000 tonnes will be processed locally, an annual output of 220,000 tonnes of alumina being envisaged.

The Fria Concession, which belongs to the Péchiney-Ugine Group with its European associates, will produce on site 480,000 tonnes of alumina from locally-won bauxite.

From Boke and Fria together, there will be extracted from 1961 onwards 3,000,000 tonnes of bauxite a year, half of which will be converted on site into 700,000 tons of alumina. After the central power station at Konkouré has been completed, 250,000 tonnes of aluminium a year will be fabricated on site.

For the production of alumina alone, these projects will necessitate a combined investment of Frs.89,500,000,000. Aluminium Ltd., which is exploiting the Boke concession, will provide from its own resources the requirement investment of Frs.40,000,000,000, which will be additional to the Frs.5,000,000,000 already invested in Iles de Loos. This company will thus become the largest private investor and also the largest foreign investor in any undertaking of the French Union.

The Fria Region

A private Franco-American-Anglo-Suisse consortium will create the bauxite-alumina industrial zone in the Fria region. The Frs.49,500,000,000 required for this region will be forthcoming from the following sources: French private group Frs.10,000,000,000 (Frs.8,000,000,000 from Péchiney and Frs.2,000,000,000 from Ugine), American private group Frs.21,000,000,000, Swiss private group Frs.4,000,000,000, English private group Frs.7,000,000,000, public participation (Caisse Centrale de la France d'Outremer) Frs.7,500,000,000.

On February 9, 1957, the international consortium formed a company at Conakry with a capital of Frs.2,000,000,000 in 100,000 shares, under the name of Fria. Péchiney and Ugine hold 23,000 shares, Olin Mathieson Chemical Corporation, New York, 50,000 shares, British Aluminium Co. Ltd., London, 17,000 shares, and Aluminium Industrie Gesellschaft Chippis (Suisse) 10,000 shares. The French group, though holding only 23 per cent of the capital, is assured control of the company by holding 53.6 per cent of the votes.

A company, known as "Societe Civile d'Etudes Hydro-électriques du Konkouré et du Kouilou", has also been formed, its capital being Frs.1,000,000. The participants are Caisse Centrale (55 per cent) and Péchiney, Bauxites du Midi, Montecatini, Vereinigte Aluminium Werke, Société Anonyme pour l'Industrie de l'Aluminium (each 9 per cent). The object of this company is to undertake technical studies preliminary to harnessing the hydro-electric resources of Konkouré and Kouilou.

The Konkouré undertaking involves the construction of two barrages, one on the Sonapiti (145 m. fall, flow 365 cu. m.) and the other on the Amaria (70 m. fall, flow 750 cu. m.). The central power station could produce 5,100,000,000 kWh. a year. No information regarding costs of construction are as yet available, but from preliminary studies it can be estimated that the cost per kWh. would not exceed Frs.1.50.

Financing the Konkouré Dam

Since this article was written, plans for the establishment of a new primary aluminium industry, based on the projected hydro-electric power development in French West Africa, have moved closer to implementation.

The French Government recently made certain proposals concerning the financing of the Konkouré dam which were accepted in principle by the aluminium companies, subject to certain conditions being satisfied. These were, firstly, that an international loan be obtained for partial financing of the hydro-electric project; secondly, that legal and fiscal agreements could be arranged with the French authorities; and, thirdly, that the final estimates of the cost of constructing the power project would result in power costs competitive with those attainable elsewhere.

An agreement in principle on the financing of the scheme was reported to have been reached last week between the French Government and a consortium of world aluminium producers including Péchiney, Ugine, Aluminium Ltd. of Canada and a number of Italian, Swiss, German, British and American concerns. These producers made their agreement conditional on aid for the project from the World Bank. Another condition for their participation was the conclusion of agreements with the French Guinea authorities defining the legal and fiscal conditions of the consortium's operations in the territory.

The present plans involve the formation of a power company with French Government participation to construct a hydro-electric development on the Konkouré river. This power plant would have an installed generator capacity in excess of 700,000 h.p. with a firm power output sufficient to support an ultimate smelting capacity of 165,000 s.tons of aluminium per annum. A separate company would be established to construct and operate an aluminium plant of this capacity. Aluminium Ltd.'s share of ownership in the smelter company would be 20 per cent.

Roads should be ready to allow work to start on the dam itself by the end of 1958. The first ingot of aluminium metal would be produced in mid-1964. Under the agreement, the French partners in the consortium, Péchiney and Ugine, would have rights over half the estimated annual output of 150,000 tons. The remaining 75,000 tons would be divided between the other members: British Aluminium, Society pour l'Industrie de l'Aluminium (Switzerland), Olin Mathieson Corporation (United States), Aluminium Ltd. (Canada), Montecatini (Italy) and Vereinigte Aluminium Werke (Germany).

The French, British, Swiss and American partners in this consortium are already grouped in the company known as Fria, to which reference has previously been made.

Aluminium in the Middle Congo

The Kouilou project aims at producing, on the Sanaga site, 6,500,000,000 kWh. a year to supply power not only for a reduction works at Pointe-Noire with a capacity of about 200,000 tonnes annually, but also for electro-metallurgical and electro-chemical industries such as ferromanganese, ferrosilicon, silicon carbide, magnesium, and phosphate and ammonia fertilizers. The production of ferromanganese from manganese extracted from the Franceville deposit would be carried out in the Pointe-Noire region.

Machinery and Equipment

Resilient Piping Combats Mined Soil Subsidence

A problem common to mining areas throughout the world is that of soil subsidence. A typical instance is the mining town of Codnor, Derbyshire, where the road which carries the main sewer has sunk 5 ft. in the past seven years.

Certain steps have now been taken by the local authority, the Heanor Urban District Council, and the National Coal Board to reduce the inconvenience to a minimum. At a recent installation in Denley Lane, Codnor, the National Coal Board agreed to the use of Key Engineering Co., Ltd., fibre drain pipe to replace the damaged drainage system.

The resilience of this type of piping allows it to conform to reasonable subsidence without cracking or leaking, and the pipes quickly adjust themselves to any unevenness in the trench. Although the pipes can stand deflections of several inches, there are, of course, instances of bad subsidence when there might be falls amounting to feet; in these cases, when the piping is dislodged, it is possible to re-lay the same lengths and thus achieve a considerable saving.

MATCHED TRACTOR EQUIPMENT

A full range of matched equipment is now available for the Industrial Track-Marshall, which incorporates the 50 b.h.p. Perkins L4 diesel engine and 5-roller track frames, The manufacturers are Marshall, Sons and Co., Ltd.

The Marshall Hydraulic Angledozer is tailored to the Track-Marshall and provides a robust, well-balanced unit. It incorporates Dowty hydraulics operating at medium pressure with a four-position control valve. The Marshall Bulldozer, a new fixed type with box-section blade and tubular bracing to the side arms, is strong and rigid, having a shorter blade than the Angledozer, but incorporating the same hydraulic system.

Driven from the power take-off, the TM2 Cable Control Unit has all its mechanism contained in an oil-filled casing and protected by oil seals. One of the main features of this unit is its ease of operation. The levers work in a vertical plane, the angular position being adjustable to suit the driver's convenience. Operation is positive and sensitive, with no stiffness or backlash.

The 4-6 cu. yd. TM2 Open Bowl Scraper is matched for use with the TM2 Cable Control Unit. The open bowl construction takes full advantage of the high drawbar pull of the Track-Marshall by concentrating an increased proportion of the scraper's weight directly over the cutting edge, thereby increasing loads and shortening digging times.

There is also available for the Industrial Track-Marshall a Boughton Heavy Duty Haulage Winch which, with the anchor fitted, is capable of line pulls of up to ten tons.

SUBSURFACE EXPLORATION

The Model MD-1 Refraction Seismograph, announced by Geophysical Specialities Co., United States, is specifically designed for shallow subsurface exploration to depths of 50 ft. or less. It works on the principle that sound waves from a sledgehammer blow (or explosive, if preferred) will travel along different paths and at different speeds through the subsurface, depending upon such things as the nature of the material, the depth to bedrock or consolidated material, and the presence or absence of bedrock. The Model MD-1 measures the time interval required for the waves to travel from the source to a sensitive sound detector. Both source and detector are located at the surface, hence no drilling is required. Time intervals are measured for various distance intervals, up to a few hundred feet. The desired subsurface information can be quickly calculated.

The Model MD-1 introduces a new conception to instrumentation for refraction seismology. Utilizing the most modern advances in the electronics art, including transistors and printed circuitry, it measures the time interval directly to a high degree of precision. A time-interval meter is started by the hammer blow (or explosion), and is shut off by the sound wave as it reaches the detector. The time interval can be read directly on indicator lights on the panel.

Field operations are quick and simple. The time for a single-depth determination depends upon depths and surface conditions, but even a 50-ft. determination normally requires no more than 20 mins.

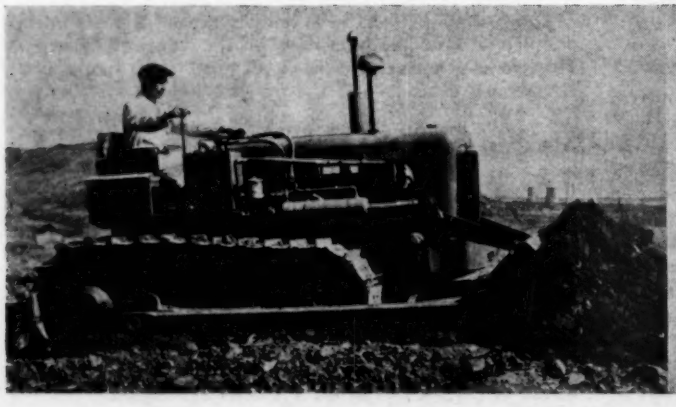
The Model MD-1 Refraction Seismograph is supplied in an anodized aluminium case 16 in. by 9 in. by 7 in., which also contains a built-in power supply and blasting circuit. External components include one geophone with connecting cable, one 100-ft. and one 200-ft. hammer or firing cables, one grounding rod, and four switches for attaching to sledgehammer handles or other impact sources. Total weight approximately 16 lb.

MINE CAR TURNTABLES

Power-operated turntables manufactured by Plowright Bros., Ltd., provide an efficient means for changing the direction of mine cars in a restricted space and are of particular value when incorporated in underground or surface closed circuits. The turntable simplifies pit bank design considerably, making very short circuits possible, thus economizing in capital expenditure. The length of the heapstead building to house the circuit is reduced, as well as the amount of trackwork required.

Rotating continuously, the turntable can deal with a steady feed of cars, smoothly and efficiently, without any controls. It is supported on a self-

At left is the Track-Marshall diesel crawler tractor equipped with Marshall hydraulic bulldozer. At right, the Model MD-1 Refraction Seismograph with external components



contained frame and occupies little space. Because the turntable is automatic in operation, there is a big saving in manpower. Four standard sizes of turntable are made, 10 ft. dia. for tubs and 12 ft., 14 ft. and 16 ft. for mine cars.

REVISED BRITISH STANDARDS

The British Standards Institution have introduced several notable improvements in a revised edition of B.S. 708, concerning trailing cables for mining purposes. The standard, widely used in industry, provides specifications for cables used with coal cutters, conveyors, loaders, drills, and remote-control circuits. It also contains provisions for a new range of pliable armoured cables for use in coalface lighting.

Constructional details include overall diameters, dimensions of conductors and requirements for protective screens, insulation material and sheaths. The comprehensive tests laid down ensure satisfactory thickness of insulating material and sheathing, adequate over-voltage and insulation resistance, and resistance to flame.

Since British Standard 1162:1957 was first published in 1944 on the basis of a specification prepared by the Natural Asphalte Mine-Owners' and Manufacturers' Council, there has been a good deal of progress in the methods of manufacturing and testing the materials concerned. The revised edition of the standard recently published takes account of these advances and brings the definitions used into line with those in revisions of other British Standards for asphalt products.

Baker polygon-shaped platinum crucibles

Among the main changes, a maximum hardness number is now given in addition to the minimum previously laid down; and, in order to narrow the permitted limits of composition, separate analyses are specified for use with natural rock from Swiss sources and for rock from all other sources.

The standard is divided into four sections, the first of which is primarily concerned with definitions; the second gives required properties of the materials such as flux oil, natural rock asphalt, aggregate and two types of asphaltic cement; the third section deals with the manufacture of mastic asphalt blocks and the remelting procedure on site; while the final section covers sampling and testing requirements.

POLYGON-SHAPED CRUCIBLES

Thoroughly tested under actual laboratory conditions, the polygon-shaped crucible manufactured by Baker Platinum Division is claimed to have demonstrated greater stability, versatility and ease of handling than the conventional, standard round-shaped type. As a result of its flat sides and more stable flat bottom, this newly developed polygon-shaped crucible offers several advantages.

Firstly, due to the crucible's flat sides, a better surface is provided for tongs, thus avoiding the tendency to crimp to which conventional crucibles are prone. Another advantage is that, due to their

shape, there is always a corner spout opposite each flat side which facilitates easy pouring, and with these flat sides, two crucibles can be picked up and handled at one time.

Baker polygon-shaped platinum crucibles are now available in the same capacities as the "K" series.

A WALKING MAGNETOMETER

We have been asked to state that the A-4 Walking Magnetometer described in *The Mining Journal* of September 20, 1957, is designed, developed and manufactured by Sharpe Instruments, Ltd., of Canada.

MINING MISCELLANY

The Gewerkschaft Mechernicher Werke lead mines in Western Germany are to be closed.

★

The time limit for applications for permits to prospect for minerals in Angola and Mozambique has been extended to December 30 next.

★

The 3,600 workers—both clerical and manual—at Anaconda's Potrerillos mine have given notice that they will strike on November 2 unless agreement be reached on an increase in wages and other benefits.

★

It is reported from Windhoek, Southwest Africa, that the Anglo American Corporation has discovered "huge" uranium deposits in the Namib desert. The deposits are said to be about 15 to 20 miles long and a half to one mile wide.

★

Reserve Mining Co. shut down its taconite pellet plant at Babbitt, Minn., last Friday. A total of 140 employees were laid off. The plant has an annual capacity of 300,000 tons of pellets. The company's main taconite plant at Silver Bay, with an annual capacity of over 5,000,000 tons, is not affected.

★

Cleveland-Cliffs Iron Co. is to reduce production at six of its eight mines in the Marquette range, U.S., to a 32-hour, four-day week on November 3. In Mineville, N.Y., Republic Steel Corp. has shut down one of its three iron ore mines in the area and has laid off 130 workers.

★

The Canadian mining company which undertook a geophysical survey of disused copper mines and existing copper deposits in western County Cork has decided as a result of the survey not to commence mining operations. The deposits are considered to be too light in view of the current low world price of copper. The survey included disused copper mines at Balycymisk, Cappaglass, and Coosheen.

★

Orders granting exclusive rights to prospect for uranium to Anglo American Rhodesian Mineral Exploration in three areas of Southern Rhodesia have been announced. They are for two years ending on October 4, 1959, and cover two adjoining areas of 8.75 sq. miles each, together with an area of 7.5 sq. miles about sixty miles north-east of Wankie. The company is required to spend a minimum of £6,000 on prospecting in each area and to adhere to an approved programme.

★

A large deposit of magnetite iron ore estimated to contain hundreds of millions of tons has been found in the south of the Kokchetav region in Kazakhstan, states a report from the U.S.S.R. These ores are said to resemble the first-grade ores of the Sokolov-Sarbai deposit now being developed in the Kazakh Republic. Another magnetite deposit discovered in the region of Lake Atansor is believed to contain up to 50,000,000 tons of iron close to the surface, which can be mined by opencast methods.

★

Noranda Mines expects within a few weeks to start feeding pyrite and pyrrhotite concentrates from its mine at Noranda, Que., to its sulphur-iron plant at Cutler, in the Blind River area. The plant, which has been producing sulphuric acid since 1956 for consumption by the area's uranium mines, will ultimately burn pyrite concentrate alone. Currently it is burning elemental sulphur to produce sulphur dioxide gas, which in turn is converted to sulphuric acid. Capacity is now 425 tons a day, but will be increased to 1,000 tons as the various uranium mines which Noranda will supply come into production. The project involves an outlay of $20,000,000.

★

Turkey's new coal washeries at Zonguldak, constructed by a British firm, were recently inaugurated.

★

Japanese aluminium companies are planning to form a joint company with Canadian and Netherlands firms to develop the bauxite resources of Borneo. It is hoped that mining operations will begin early next year. The three Japanese com-

panies are the Nippon Light Metal Co., Showa Denko, and Sumitomo Chemical. The Canadian company is Aluminium, Ltd., and the Dutch company is the Ott Group. The bauxite deposits, which are estimated at 5,000,000 tons, are located at Sematan, in Western Sarawak. They are reported to be of comparatively high grade.

★

Jordan is considering granting Poland a concession for the exploration and exploitation of iron ore in the country. An agreement to this effect has been drafted between the Jordanian Minister of Economy and the Commercial Attaché to the Polish Legation in Beirut. In the agreement, now under consideration by the Cabinet, the Poles undertake to supply technicians and mineral prospectors on condition that the Jordan Government pays their fares and expenses. The Poles also undertake to mine and market the ores if sufficiently large deposits are found. It is believed that in addition to iron, copper and phosphate, large deposits of gold and silver exist in the Maan district of southern Jordan.

★

In conjunction with the Stanleigh Uranium Mining Corporation of Canada, Australasian Oil Exploration is to form a company with a nominal capital of £A2.5m. to evaluate Andersons lode uranium lease, near the Mary Kathleen Mine, Queensland. The Stanleigh Corporation has undertaken to pay all expenses involved in the evaluation of the lease and will endeavour to obtain about $10,000,000 finance if the new company obtains a sales contract, an economic treatment method is found, and sufficient tonnage proved to warrant the erection of a treatment plant.

The Chilean Minister of Economics has proposed emergency measures to deal with the crisis facing the small and medium copper producers and prevent the complete paralysis of their mines. Among measures proposed by the Minister are a reduction in the price of electricity supplied to the mines by Endesa, and a change in regulations concerning import duties on mining equipment. Another possible measure is the lending of 3,000,000,000 pesos to Caja de Credito Minero so that the present price of 29.5 c. per lb. of copper paid by this organization to the mines can be maintained during the next twelve months.

★

A ten-year agreement has been concluded between the Jordanian Phosphate Co. and the Jugoslav Yuko Metal Co. which is aimed at increasing phosphate production in Jordan. The agreement provides for gradual increase of production from the Rassifa mines to up to 2,500,000 tons annually by 1963. It also provides that the Jugoslav company should start mining in the Al-Hassa region to produce 400,000 tons annually by 1960. According to the director of the phosphate company, the Jugoslavs have undertaken to buy 75 per cent of Jugoslavia's phosphate requirements from Jordan. They will also buy 350,000 tons in 1960 for hard currency. The Jugoslav company is going to send the necessary equipment, plant and technicians.

PERSONAL

The National Coal Board has appointed Mr. A. Wedgwood to be staff director of its Northern (Northumberland and Cumberland) Division. He succeeds Mr. J. V. Wood, whose appointment as Director-General of Industrial Relations at national headquarters was announced in August.

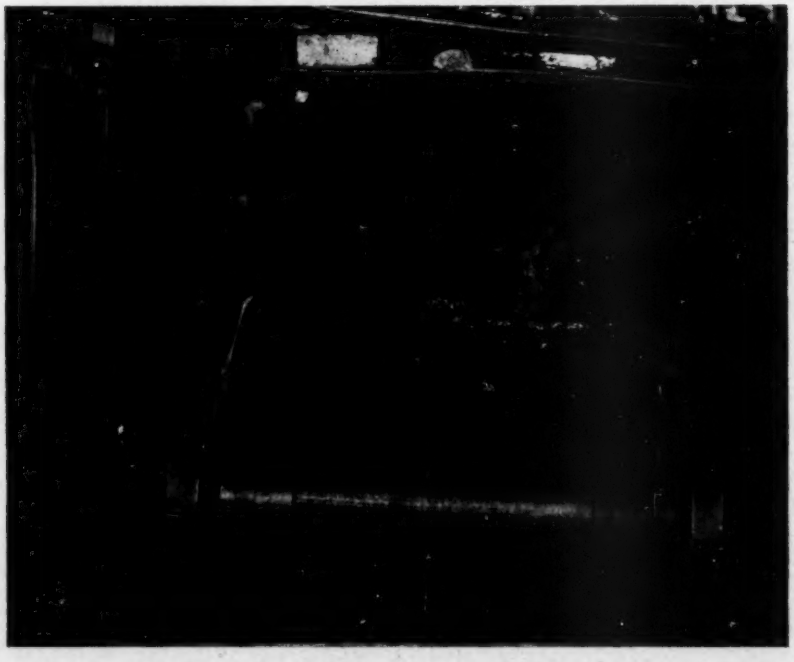
★

A Canadian Trade Mission will arrive in the U.K. on November 22 and will return on December 18. It will consist of more than fifty senior representatives of organizations normally interested in buying outside Canada, including officials of the Federal and Provincial Governments, and will be led by the Hon. Gordon Churchill, Minister of Trade and Commerce. The deputy leader will be Mr. James S. Duncan, chairman of the Hydro-Electric Power Commission of Ontario and of the Dollar Sterling Council. The mission is a direct outcome of the recent talks in Canada between Canadian Ministers, the Chancellor of the Exchequer and the President of the Board of Trade.

★

An Hydraulics Department has been established by Ruston and Hornsby Ltd., Lincoln, and is located at the company's Anchor Street works. It will be responsible for engineering control of fuel-injection equipment, of Ruston and Hornsby design. Mr. E. R. Groschel has been appointed engineer-in-charge.

Considerable quantities of nylon conveyor belting are already in use in Britain's coal mines, at the present time chiefly in solid woven belting, although there is increasing interest in plied belting. The bulk of the solid woven nylon belting is in use at the coal face. This photograph, taken in the Haigh Moor seam of Manvers Main Colliery, gives a good impression of the severe conditions under which belting must operate. Nylon's advantages here are its vast strength and abrasion resistance coupled with its outstanding ability to absorb shock loads. In addition it has very high wet strength



CONFERENCES AND EXHIBITIONS

The 1958 Sydney (Australia) Engineering Exhibition will be held between July 14 and July 19 inclusive.

★

The Metallurgical Engineering Committee of the Institute of Metals is arranging an all-day informal discussion on "Fuel Efficiency in the Melting and Thermal Treatment of Metals", to be held at the College of Technology, Gosta Green, Birmingham, on Wednesday, February 26, 1958.

★

The inaugural meeting of the recently formed Powder Metallurgy Joint Group of the Iron and Steel Institute and the Institute of Metals will be held on December 4, at Church House, Great Smith Street, London, S.W.1, at 10.30 a.m.

AGENCY WANTED

Comimportex, Casilla 1486, La Paz, have informed the British Embassy at La Paz that they wish to contact United Kingdom manufacturers of crushing and grinding machinery for use in mines. Manufacturers interested in this enquiry should write direct to the Bolivian concern. All quotations should be shown in U.S. dollars. It would be appreciated if, at the same time, responding firms would copy their initial correspondence to the British Embassy, Commercial Section, Casilla 694, Avenida Arce 1216-1218, La Paz. Ref. E.S.B. 23273/57 I.C.A. Telephone Chancery 4411, extension 776 or 866.

CONTRACTS AND TENDERS

Further amendments have been made to the I.C.A. procurement for Taiwan (Formosa), Project Implementation Order No. 84-21-007-9-70250. *Vide* our issues of 28/6/57, page 819, and 20/9/57, page 340. The latest amendments extend the bids opening date to 4/11/57 and delivery to before or about 31/3/58.

Metals and Minerals

Titanium in Search of Civilian Markets

The sixth annual Titanium Symposium, to be held in Chicago from November 3 to 7 at the autumn meeting of the Institute of Metals Division, the Metallurgical Society of the American Mining, Metallurgical and Petroleum Engineers, will take place against a background of temporary setback in the fortunes of a metal whose long-term prospects can scarcely be questioned.

According to the U.S. Department of Commerce, domestic production of titanium mill products was again lower in August for the fifth successive month, totalling 389 s.tons against 449 s.tons in July. Production of titanium ingot totalled 511 s.tons compared with 756 tons in July.

The U.S. Government has taken action to permit producers of titanium mill products to try to develop greater commercial uses. As from the beginning of October, these producers can devote less of their capacity to defence orders. Hitherto, producers of titanium mill products have had to accept defence orders for up to 90 per cent of their scheduled output. Under a new directive of the Business and Defence Services Administration, they need accept rated orders only up to 75 per cent of scheduled production. They are thus able to schedule and deliver unrated orders with less likelihood that these will be displaced on their schedules by orders with defence ratings. This amendment will give much wider scope to various metals fabricators who have held back from research projects on titanium because of their fear of being unable to secure sufficient titanium for alloying purposes. Many metallurgical experts have indicated their belief that titanium's possibilities would not be fully realized until consumers could be assured of sufficient supplies of high-grade metal to justify widespread experiments and research.

Japan's exports of titanium sponge are to be cut drastically from the original estimate made last April at the beginning of the financial year. By agreement between the Japanese Ministry of Trade and the titanium industry, the export target for the current financial year has been lowered by 57 per cent to 1,872 tons from the original figure of 4,326 tons, while the estimate for production during the year has been reduced to 2,554 tons from the original 4,382 tons. This action has been taken to offset the sharp decline in import requirements of U.S. civilian users, caused by the reduction in prices of U.S. titanium and changes in demand from the U.S. Air Force. Exports were expected to revive, however, because shipments of titanium sponge destined for the U.S. Commodity Credit Corporation were scheduled to start in October.

Kobe Steel Works, one of Japan's two manufacturers of titanium mill products, has completed construction of two electric furnaces for the production of metallic titanium. This company is now capable of producing ten tons of titanium ingot monthly, and its output will soon be expanded to fifteen tons monthly. The other producer is the Sumitomo Metal and Mining Co., which has a capacity of three tons monthly.

A new process for refining titanium is being developed in Japan and is claimed to be exceptionally simple to operate. It is reportedly designed to use titanium tetrachloride as the starting material, and operation is said to depend on the use of magnesium in a gaseous form as the refining agent.

At a recent meeting of the Society of Mining Engineers and the South-eastern States Mining Conference in Tampa, Florida, it was predicted that in the not distant future titanium metal production would be using ilmenite rather than rutile as the source material. In making this forecast, Mr. Harry C. Cannon said that, with the plant at Sorel, Quebec, using pyrometallurgy in processing a low TiO_2, high iron ilmenite to pig iron and titanium slag products, and with a number of other processes under investigation, it was impossible to tell what characteristics might ultimately be preferentially desirable in ilmenite. With iron being efficiently recovered as a market product, perhaps the premium value currently given high TiO_2 ilmenites would disappear. Then geographical location might dominate the choice of an ilmenite for processing, with composition factors playing a minor rôle.

There can assuredly be little doubt that, as time goes on, technological progress will lead to further substantial economies in the production of titanium metal, thereby contributing to the establishment of civilian markets on a progressively broader front.

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Research workers at the U.S. Bureau of Mines have developed a process to recover columbium and other valuable by-products from certain domestic submarginal titanium deposits. Columbium and iron were recovered simultaneously with titanium from several low-grade Arkansas materials during tests.

ALUMINIUM'S EXPANSION PROSPECTS

Mr. Nathanael V. Davis, president of Aluminium Ltd., has stated that plans to expand the company's Canadian ingot capacity to 850,000 tons by 1958 from the present 770,000 tons had been deferred. Completion of an additional 80,000 tons of capacity at Kitimat, B.C., has been postponed. The deferment of these extensions, however, will be undertaken in a manner which will permit completion of the facilities on short notice.

Mr. Davis said that, while consumption of aluminium was well sustained in most markets, these adjustments in the expansion programme reflected the company's expectations that new production coming into operation during the next year or two in the industry as a whole would take time to absorb.

This decision leaves basically unaffected the company's programme for the development of new hydroelectric and raw materials facilities, upon which future ingot expansion will be based. This latest adjustment is expected to reduce capital expenditures by approximately $30,000,000 during the period 1958-59.

In the U.S. aluminium supplies are now expected to outstrip demand until some time in 1958. The U.S. Business Service estimates supplies this year at about 350,000 tons above consumption, which is forecast at 2,000,000 tons. Greater use of the metal in the automotive and construction industries should result in higher aluminium sales next year.

The U.K. aluminium market continues to experience a certain amount of competition from Russian metal. The prices at which the Russian metal is offered are not always very clearly defined, but offers down to £185 per l.ton c.i.f. are still heard of, which compares with £197 for Canadian ingot of 99.5 per cent. The quality of the Russian metal is said to be comparable to that of Canadian, parcels assaying 99.6 and 99.7 per cent being not uncommon. Some sources have estimated that up to as much as 15,000 tons will have been brought into the U.K. by the end of this year.

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Aluminium Francais, the joint selling corporation of French aluminium producers, has fixed the basic price of virgin aluminium on the home market at Frs.198 per kilo. The previous price was Frs.184.50. This action follows the decision of the French Government's Price Board to authorize a free fixing of aluminium prices in France, thus removing Government control. The basic price stands for net unpacked without the *ad valorem* turnover tax, f.o.r. producers' station or—in the case of Cameroons metal—import port.

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The Taiwan Aluminium Corp., of Formosa, which represents the aluminium industry of Free China, is working on a broad-scale modernization project designed to increase not only ingot production capacity but also mill and fabrication facilities. Under expansion plans, the present reduction facilities at the Kaohsiung works will be modernized and 32 new pots are scheduled to be added for the initial stage. The ultimate capacity target is 20,000 tons a year.

QUEENSLAND BAUXITE

The Queensland State Cabinet has approved the draft of an £A50,000,000 agreement with the Consolidated Zinc group to mine bauxite in the Cape Yorke Peninsula in Northern Queensland. The agreement—to be incorporated in special legislation this year—provides for the establishment of a township for 6,000 people and a harbour and initial treatment works at Weipa on the peninsula's west coast. Under the agreement the

company is required to reduce the bauxite to alumina on the field. After 20 years the company must establish an aluminium smelter in the area if required to do so by a Government-appointed tribunal.

URANIUM PRODUCTION EXPANDS

Shipments of prescribed materials from South Africa under the Atomic Energy Act reached a total value of £31,600,000 during the first eight months of this year, reports Barclays Bank D.C.O. This compares with £25,100,000 in the same period of 1956. The Bank states that production of uranium oxide in South Africa is approaching 6,000 tons annually. The figure for Canada, where output is rising more rapidly, is 8,000 tons.

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The U.S. will have to find "a lot more uranium than we have now or compete for our supply in the international market," states Mr. Floyd Odlum, president of Atlas Corporation. He predicts that the U.S. uranium reserves, estimated by the A.E.C. at 67,000,000 s.tons, will be enough for ten years only.

Atlas controls about 3,500,000 tons of uranium ore and has an interest in about 6 per cent of the U.S. uranium milling capacity. The overall value of its proved uranium reserves is placed at about $100,000,000. Mr. Odlum considers that the company should get back the full value of its uranium investment, plus a clear profit of 10 per cent a year.

PAKISTAN'S SILVER REPAYMENT

The first consignment of 14,778,290 oz. of silver arrived recently in New York as the initial instalment towards the repayment of 53,500,000 "Lend-Lease" ounces of silver by the Government of Pakistan to the Government of the U.S. A further consignment of 15,519,360 oz. will be dispatched shortly, while the Bank of England will ship directly to the U.S. 221,710 oz. which it has been retaining on behalf of Pakistan. The balance of 22,938,000 oz. is to be returned in the five years beginning on April 27, 1958.

QUICKSILVER'S FURTHER FALL

The London ex-warehouse price of quicksilver was reduced on Tuesday from £74 to £72 10s. per flask. The price last changed on October 23, when it was lowered from £75 to £74. It remains to be seen whether London prices can sink much lower, bearing in mind that the U.S. Government is buying domestically produced metal at $225 per flask and Mexican metal at $205, the latter price being equivalent to about £73 5s. per flask. World production—estimated at about 200,000 flasks for 1957—is believed to be considerably above current consumption. Nevertheless, the Spanish and Italian producers are still seemingly uninterested in competing with the cheaper offers emanating from other sources.

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New estimates of the reserves of mercury ores of mineable grade in the U.S. have been made by the Geological Survey. The total reserves of all classes of ore now amount to 315,300 flasks, of which approximately half is measured or indicated and the remainder is inferred. Current domestic production is at the rate of about 30,000 flasks a year and domestic consumption has required about 55,000 flasks a year during the last two years. Domestic reserves of ore mineable at current prices are thus sufficient to supply the U.S. annual requirements for only a few years.

The new estimate of reserves indicates that the rate of discovery is keeping pace with production. Not reflected by the figures, however, is the fact that much of the ore now classed as measured and indicated has a greater degree of assurance than in previous estimates. This situation exists largely because the Government floor price of $225 a flask, guaranteed for a three-year period in July, 1954, and subsequently extended, has led mine operators to block out ore in advance of mining, a practice which in the past was rarely done because of uncertainty as to the future market.

COPPER · TIN · LEAD · ZINC

(From Our London Metal Exchange Correspondent)

Last week it was reported that a number of people were beginning to say that they thought the downward movement in metal prices was due to cease. During the last few days sufficient of them have translated their thoughts into action to give a very firm undertone to markets and an appreciable rise in quotations, although at the moment it must be admitted that the change is due to sentiment only, as there is no evidence that consumers have yet decided to enter the market again other than for day-to-day requirements.

The movement was triggered off by President Eisenhower's statement that he intends to make a number of speeches pointing out that the American economical position has not suffered any real setback, but only that the rate of going forward has decreased.

COPPER'S FIRMER TREND

In the case of copper, the market was influenced by the remarks made by Mr. Glover, chairman of the Anaconda Co., when he pointed out that the actual consumption of copper is considerably larger than indicated by deliveries of refined metal. At the same time, he expressed the opinion that the running down in stocks is almost completed, and it is his belief that the copper market will shortly return to a situation where sufficient production and not sufficient demand is the problem.

On the London market the prices have been firm, and although a few people think that the market may be in for a sharp rise, the majority feel that the most which can be said is that the downward trend has been stopped. There has been little evidence of consumer activity, but support has come from the closing out of short positions and also by the purchasing of metal for shipment to the U.S., which became possible with the prices ruling last week-end.

It would appear that this arbitrage business may form the floor to any recession in price, as reports from America indicate that copper can be sold at around the customs smelters' price at 25½ c. per lb. This same demand has also caused the contango to diminish a little and stocks at the beginning of the week were 202 tons lower at 18,663 tons.

HOW MUCH SURPLUS TIN?

The only item of interest in the tin market has been the communiqué issued by the International Tin Council, which confirmed that a small reallocation had been made of the votes amongst producing countries, announced that the buffer stock had 3,916 tons of cash and forward tin on June 30, and made a revised estimate of the surplus metal for 1957 at 12,500 tons against the 6,000 to 7,000 tons estimated at the end of July.

During the week under review the price of cash tin has been slightly above the support level on a number of occasions, and demand for three months' metal has picked up, but no one expects the present price level to alter materially in the coming months.

The estimate of the surplus tin has been the subject of a number of comments, the majority of which seem to be that, in fact, the surplus may prove even bigger, but in most cases this opinion is based on an assumption of the continuation of shipments of Russian tin—and in this respect it is as well to remember that during the cold season such exports may be non-existent. Stocks at the beginning of the week showed a decrease of 97 tons at 3,630 tons, and on Thursday morning the Eastern price was equivalent to £723½ per ton c.i.f. Europe.

MORE ZINC FOR CARS

Once again the lead and zinc markets have been featureless, both taking their tone from the developments in copper, although a little additional demand has been reported for high-grade zinc for the motor industries both in this country and in America. The American Government continue to take their monthly quota into the stockpile, and it is expected that for October they will again absorb 10,000 tons of zinc and 5,000 tons of lead, but it is realized that these operations are almost certain to end as soon as the Tariff Commission have made their recommendations.

Closing prices are as follows:

	Oct. 24		Oct. 31	
	Buyers	*Sellers*	*Buyers*	*Sellers*
COPPER				
Cash	£182½	£182¾	£190¼	£190½
Three months	£185½	£186	£194	£194¼
Settlement	£182¾		£190½	
Week's turnover	7,625 tons		8,675 tons	
LEAD				
Current ½ month	£83½	£84	£86	£86½
Three months	£84½	£84¾	£86½	£86½
Week's turnover	5,175 tons		3,225 tons	
TIN				
Cash	£730½	£731	£730	£730½
Three months	£725	£726	£722½	£723½
Settlement	£731		£730½	
Week's turnover	1130 tons		1,560 tons	
ZINC				
Current ½ month	£68	£68½	£70½	£70½
Three months	£67½	£68	£70	£70½
Week's turnover	3,850 tons		3,650 tons	

London Metal and Ore Prices appear on page 524.

Mining Finance

"Rhoanglo" Group Earnings

The Rhodesian copper-mining season of preliminary profit and dividend statements for the year to June 30 last has now concluded with those for Rhokana and Rhodesian Anglo American in the Anglo American Corporation of South Africa group. These particular companies do not issue quarterly reports, but market forecasters who were taking a line through the Rhodesian Selection quarterlies and the cuts already made in the "Anglo" group interim dividends found themselves little out in their calculations. The final dividends were 5s., net of Rhodesian tax, against 7s. for Rhoanglo and 35s. against 55s. for Rhokana. They brought the 1956-57 totals up to 6s. 6d. against 9s. for Rhoanglo and 45s. against 70s. for Rhokana.

The latter is the operating concern. Its gross mining profits have fallen by 48 per cent to £8,745,820, which is much in line with Roan's 50 per cent decline, but more than the 37 per cent fall in Mufulira's earnings. Rhokana's total gross profits are, however, down by a lesser percentage owing to its substantial investment income which brings the aggregate figure up to £12,772,331 against £22,056,704 for 1955-56. After tax and preference dividends and redemption, the company is left with a disposable balance (ignoring a special tax provision no longer required) of £9,837,539 out of which the Ordinary dividend takes £5,625,005 and capital expenditure £500,000 more than a year previously at £3,500,000. Owing to the big allocations to reserves in the boom years it has been possible, however, to cut the amount put to general reserve from £4,200,000 to £647,733.

At the moment lower earnings are in view for the current financial year, and as with the R.S.T. group one of the main question marks is by how much any further dividend reductions can be cushioned by cuts in allocations for capital expenditure. It is, of course, too early in the year to next June to draw any hard-and-fast conclusions, but it has to be firmly borne in mind that profits for the past year came from an average copper price in the region of £250. The metal, now £189 per ton, has a long way to go to produce a 1957-58 average of anywhere near this. In the meantime, the R.S.T. quarterlies due in exactly a fortnight's time will kick off the earnings picture for that period.

Rhodesian Anglo American owns 52 per cent of the Rhokana equity and a direct 21 per cent stake in Nchanga (which company ended its financial year on March 31 last), as well as a number of other relatively minor shareholdings. Its net profit for the year to June was down by 30 per cent at £5,155,235 and the dividend, as already mentioned, is lowered by much the same percentage to 6s. 6d. The yield on this basis at 65s. ex dividend without allowing for double tax relief is 10 per cent. At the moment, as with the other copper shares, it is potentially less than this for the current financial year.

KAMUNTING'S GOOD RESULTS

How well some of the efficient multi-dredge tin companies can do with tin between £700 and £800 per ton should be increasingly illustrated as the results for financial years ending in 1957 come along. The latest example is Kamunting which has boosted its profits for the year to March 31 last to £525,700 from £390,972 for 1955-56, the combined effect of a higher metal price and a further sharp increase in production which, according to the monthly returns, totalled 2,354¾ tons of concentrates for the latest period against 1,845 tons in the preceding year and only 1,092 tons in 1954-55. The higher output stems from the successful removal of the two former Pangnga dredges in Siam to a new property.

Tax on the present occasion only takes £123,500 against £160,000 despite the higher earnings and it can safely be concluded that some benefit from the company's almost automatic qualification as an O.T.C. has already been allowed for in the tax provision. The dividend on the 5s. shares has been stepped up from 30 per cent to 47 per cent with a final of 37 per cent. But even this increased payment only absorbs £180,730 from the £402,200 that is available after tax. The opportunity has been taken to raise the allocation to the reserve for the transfer of dredges from £96,016 to £220,000, leaving the carry forward slightly higher at £86,363.

This is a wise move in the light of the fact that No. 6, the biggest dredge on Kamunting's Malayan property, will have to be expensively moved to new ground next year. Presumably it is intended to provide the money out of profits in the same way as the Siamese removals were financed. Similarly, moving the big No. 6 dredge will, of course, mean a sharp falling away in production while the operation is being carried out. It is possibly this prospect, plus the fact that output for the current financial year to date has shown some falling off (the six-month total is 1,084¼ tons), which explains why Kamunting at 12s. 6d. offer a yield of fully 20 per cent. Even so, they should be cheap on the long term. There are good life prospects on the new ground both in Malaya and Siam.

LONDON MARKET HIGHLIGHTS

Holders of base metal shares who have been going through a thin time during the past year or more may have been able to take more than the proverbial grain of comfort out of the behaviour of mining shares during the past week. Copper shares, in particular, have jumped smartly back into prominence, although the metal itself for the cash position has only improved to £188 15s.

There is still more than one dealer in copper shares who is uncertain about the more immediate outlook. It is recognized that with the Rhodesian annual reports pending in the near future—and there is much concern about what the Bancroft statement may contain—the nearby news from the mines is not likely to be encouraging. On the other hand, these reports will be substantially historical in content and the share market has already discounted quite a lot.

Of more urgent consideration has been the encouraging statement about the copper position by Mr. Glover, the chairman of Anaconda.

In the event, we have had Bancroft in the Rhodesians jumping to 24s. 3d. against 22s. a week ago, while more impressive rises have been recorded by Nchanga at 185s., "Rhoanglo" at 65s., R.S.T. at 16s. and Rhokana at 26½. Pending the almost immediate declaration of the final dividend, Messina shares have returned sharply in demand owing to basically better feelings about the copper outlook, the price having recovered strongly to 97s. while the options have spurted to 49s. 6d. Rhodesia-Katanga, whose fortunes rest on the complex Kansanshi mine in Northern Rhodesia, have at one time been under 20s. but have recovered with the rest to 21s. 9d. With copper down to around £180 it was beginning to be doubted whether Kansanshi would still be carrying on with its initial production programme and development schedule. By all accounts all programmes are being maintained without immediate reference to the price of copper.

Lead-zinc shares, with a firmer trend in the metal prices, having been pulling up to a considerable extent, Consolidated Zinc having recovered very smartly to 56s. 9d. against a low this year of only 50s. 9d. not so long ago. Mount Isa (27s.) have also come back into the picture. Until the beginning of the week buyers of tin shares were still around but in the past few days they appeared to have been deterred by deliberations of the International Tin Council meeting. Some quarters think that this week's easier tendency in the share market may be no more than a technical adjustment and that this market could return to favour. After the appearance of the latest results Southern Kinta was quoted at 17s. and Kamunting at 12s. 6d.

Gold shares have not been left in the cold. Though remaining modest, business, nevertheless, has been improving. "Newer" Kaffirs, notably those in the O.F.S. and the Western Transvaal, have, by and large, remained in favour and have been helped, not to a small extent, by "back-door" leaks concerning what reputedly took place at the September I.M.F. meeting concerning the price of gold, coupled with the fact that a year-end upswing has not been an uncommon feature in recent years.

S. KINTA'S TAX POSITION

The profit and dividend of Southern Kinta Consolidated, another Far Eastern multi-dredge tin producer, were commented on here on October 11. The full report for the year to March 31 last confirms that the tax savings then remarked upon are due to the company's qualification as an Overseas Trade Corporation as from April 6 last, which means that there has been a sharp drop in U.K. income tax liability in the latest accounts. The tax provision of £311,000 on the profit of £1,181,796 is consequently estimated to be some £319,000 lower than it otherwise would have been, but the chairman, Mr. J. Ivan Spens, points out that this was due to the actual changeover from the old tax status to the new. He stresses that tax relevant to a similar profit and dividend would be considerably more in future years than in that under review.

The balance sheet shows that net liquid assets, excluding stores, total £1,805,680 compared with the issued capital of £769,600. As pointed out on October 11, it is necessary for the company to maintain a strong financial position because by 1961 no less than seven of the nine dredges are expected to work out their existing reserves which means that new areas will have to be found and the dredges transferred thereto.

Meanwhile, the Bernam section dredge, which has been reconstructed, is now undergoing trial runs, and Southern Kinta's production, as calculated from the monthly returns, is running slightly ahead of that for 1956-57, the total for the first six months of 1957-58 being 2,072½ tons of concentrates against 3,982 tons for the whole of last year. At 17s. 9d. the 4s. shares yield over 23 per cent on the 105 per cent dividend. For the short term they look a more attractive proposition than Kamunting, but over the next four years the company will have a lot of dredge headaches even if suitable new areas of economic worth can, in fact, be found.

ANGLO'S OFFER FOR A. AND E.

The reasons why holders of African and European should accept the share exchange offer by Anglo American Corporation detailed here last week have now been circulated by the company. The main argument is that the deal will give holders of the former shares a much wider spread of interest. There is no disputing this. The only point at issue is whether a holder of A. and E., which gives a first-class straddle over the expanding gold mines of the Orange Free State and South Africa's prosperous coal industry, really wants to embrace copper and other base metals and diamonds, anyway at this particular stage of the proceedings.

Anglo American already holds about 25 per cent of A. and E. Ordinary. Its offer of one Anglo for every two African is not conditional on acceptance by any particular proportion of A. and E. holders, but it is stated that major holders of another 25 per cent of the capital have expressed their willingness to accept the offer.

Providing that the necessary resolutions are passed, it is intended that the offer will open on December 3 and close on January 2. The Anglo shares so issued will rank for the final dividend on account of 1957.

It is generally being taken for granted in South Africa that half Anglo American's £6 million 5¾ per cent convertible note issue has been taken firm by institutional investors out there, not in the U.K., including insurance companies. Moreover, the balance of the issue which is to be offered to the public is said to have been underwritten by these institutions. Preference and Ordinary stockholders of Anglo American will get preference in allotment, but subscriptions by U.K. holders is still subject to Treasury permission being obtained.

LONDON METAL AND ORE PRICES, OCT. 31, 1957

METAL PRICES

Aluminium, 99.5%, £197 per ton
Antimony—
English (99%) delivered, 10 cwt. and over £210 per ton
Crude (70%) £200 per ton
Ore (60%) basis 20s. 0d./21s. 0d. nom. per unit, c.i.f.
Arsenic, £400 per ton
Bismuth (min. 1 ton lots) 16s. lb. nom.
Cadmium 11s. 3d. lb.
Cerium (99% nett), £13 18s. lb. delivered U.K.
Chromium, Cr. 99% 7s. 2d. lb.
Cobalt, 16s. lb.
Germanium, 99.99%, Ge. kilo lots 3s. 4d. per gram
Gold, 249s. 11½d.
Iridium, £27/29 oz. nom.
Lanthanum (98/99%) 15s. per gram
Manganese Metal (96%-98%) £310
Magnesium, 2s. 5½d. lb.
Nickel, 99.5% (home trade) £600 per ton
Osmium, £20/22 oz. nom.
Osmiridium, nom.
Palladium, £7 10s./£8 0s. oz.
Platinum U.K. and Empire Refined £31/£34 oz.
Imported £28 5s./£28 15s. nom.
Quicksilver, £72 10s. ex-warehouse
Rhodium, £42 oz.
Ruthenium, £15/£17 oz. nom.
Selenium, 75s. nom. per lb.
Silver, 78¾d. f. oz. spot and 78¾d. f'd.
Tellurium, 15s. 16s. lb.

ORES AND OXIDES

Bismuth	30% 3s. 3d. lb. c.i.f. 18/20% 5s. 0d. lb. c.i.f.
Chrome Ore—	
Rhodesian Metallurgical (semifriable) 48%	£19 5s. 0d. per ton c.i.f.
,, Hard Lumpy 45%	£19 5s. 0d. per ton c.i.f.
,, Refractory 40%	£13 0s. 0d. per ton c.i.f.
,, Smalls 44%	£18 0s. 0d. per ton c.i.f.
Baluchistan 48%	£12 0s. 0d. per ton f.o.b.
Columbite, 65% combined oxides, high grade	nom.
Fluorspar—	
Acid Grade, Flotated Material	£22 13s. 3d. per ton ex. works
Metallurgical (75/80% Ca F_2)	156s. 0d. ex works
Lithium Ore—	
Petalite min. 3½% Li_2O	47s. 6d./52s. 6d. per unit f.o.b. Beira
Lepidolite min. 3½% Li_2O	47s. 6d./52s. 6d. per unit f.o.b. Beira
Amblygonite basis 7% Li_2O	£26 5s. per ton f.o.b. Beira
Magnesite, ground calcined	£28 0s./£30 0s. d/d
Magnesite Raw (ground)	£21 0s./£22 0s. d/d
Manganese Ore Indian	
Europe (46%-48%) basis 95s. freight	125d./127d. per unit c.i.f. nom.
Manganese Ore (43%-45%)	98d./100d. per unit c.i.f. nom.
Manganese Ore (38%-40%)	92d./94d. per unit nom. (including duty)
Molybdenite (85% basis)	8s. 5d. nom. per lb. (f.o.b.)
Titanium Ore—	
Rutile 95/97% TiO_2 (prompt delivery)	£45/£47 per ton c.i.f. Aust'n
Ilmenite 52/54% TiO_2	£11 10s. per ton c.i.f. Malayan
Wolfram and Scheelite (65%)	106s. 0d./111s. 0d. per unit c.i.f.
Vanadium—	
Fused oxide 90-95% V_2O_5	£11-£11½ per unit c.i.f.
Zircon Sand (Australian) (65-66% ZrO_2)	£17 per ton c.i.f.

Financial News and Results

Larger Loss by Esperanza.—Esperanza Copper and Sulphur Co., parent of Cyprus Sulphur and Copper Co., reports a loss of £22,897 in the year ended March 31, 1957, against a loss of £5,037 in the previous year. Economies are being made, and it is hoped that trading by the subsidiary in the next year or two may be satisfactory, depending on the prices available. The meeting was held in London on Wednesday. Mr. J. Ivan Spens is chairman.

Bad Year For Tin Fields of Nigeria.—A lower price for tin, the uncertain outlook for columbite, and rising costs all contributed to the doubling of Tin Fields of Nigeria's loss from last year's £2,117 to £5,144 in the year to March 31, 1957. The chairman, Mr. E. A. P. Levett Scrivener, in his circulated review, says that all feasible measures have been taken with a view to reducing expenditure and increasing tin ore production. The meeting was held in London on Wednesday.

"Knights" and N.S.A. Repayments.—Both New State Areas and Witwatersrand Gold Mining have received Court permission to repay a further part of their issued capital. New State Areas repayment is 1s. per share, reducing their face value to 17s., and Knights' 3s. 6d., reducing the shares to 1s. 6d. nominal.

Improved Results From South Witbank.—In the year ended June 30, 1957, South Witbank Coal Mines earned a taxed profit of £136,670, an increase of £11,117 over the preceding year. Dividends for the year total 25 per cent, 2s. 6d. per share compared with 2s. 3d. last year. Meeting, Johannesburg, November 13.

Yukon Consolidated Go West.—Yukon Consolidated Gold are calling a special meeting to transfer the company's head office from Toronto to Vancouver. The company's executive offices have been in Vancouver for many years and, in fact, Yukon Consolidated carries on no business in Toronto at all.

Peña Copper Mines.—At an extraordinary meeting held recently in London resolutions were passed increasing the issued capital of Peña Copper Mines to £1,500,000 and giving effect to certain modifications in the articles of association. This is the "first leg" of Peña's reorganization, the second part of which will follow at another meeting to be held at a later date. Peña is developing into a major industrial holding company, and the products of its subsidiaries already include such items as far removed from copper mining as electric blankets, bottle stoppers, ladies' knitwear and high-speed anti-G relays.

Technical Briefs

Electrode for Mild Steel Welding

A new type of manual welding electrode which combines the good welding properties of the B.S. 1719 Class 2 electrodes with the good mechanical properties and X-ray sound weld metal of the low hydrogen Class 6 electrodes, has been introduced by Quasi-Arc Ltd.

This electrode, Ferromax, representing a different approach to the problem of hydrogen in weld metals, has a rutile type of covering and yet deposits a weld metal which is very low in hydrogen content. As a result, a better shape of fillet weld is obtained compared with the standard low hydrogen electrodes and there is considerable reduction in fumes.

In addition, iron powder has been introduced into the covering, making Ferromax, the first rutile iron powder type electrode to give a low hydrogen weld metal deposit. The speeds of welding, as a result of the addition of iron powder, are considerably faster than either conventional rutile or low hydrogen electrodes and are at least equal to those of conventional iron powder rutile electrodes.

An unique feature of these heavily coated iron powder rutile electrodes is that they can be used in all positions for producing welds of high radiographic quality. They give welds of excellent shape and contour and are particularly suitable for V and U grooves in flat butt welding. The slag detachability is also excellent in all positions. The electrodes have the code No. E.917 under B.S. 1719 classification and conform to B.S. 639.

A NEW SPECIAL LUBRICANT

A special lubricant for free-piston engines has been developed by Shell. Tests leading to the development of this lubricant have taken six years and have been completed in collaboration with Société Industrielle, Générale de Mécanique Appliquée, of Lyons, France, and General Motors in the United States.

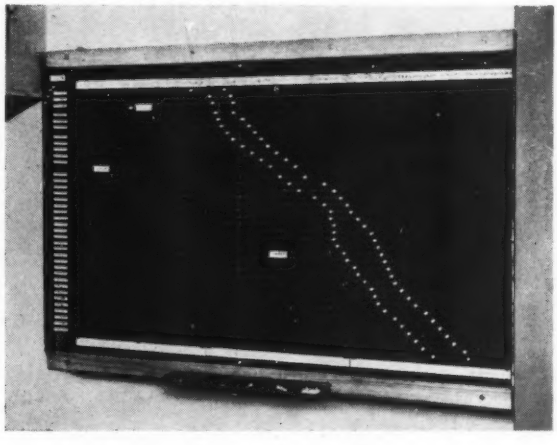
Basically, the free-piston engine is similar to a gas turbine, with this difference—a reciprocating instead of centrifugal blower is used. There are two pistons in a horizontal cylinder and fuel is supplied between them. When the pistons advance, the fuel-air mixture is compressed until it fires. This explosion throws the pistons apart. Compression of air behind them moves them forward again. The hot exhaust gases feed a turbine. It was the combination of the high-compression pressures and high heat release in the cylinders which originally caused lubrication problems.

CONTINUOUS WALL CHART

One of the major problems with wall charts, where the progress of any situation must be plotted over a period of time, has been preserving unbroken continuity. For, when the period which the chart covers ends, it has in the past been usually impossible to continue to show the state of the situation without adding another chart—or portion of a chart—to the existing one. This has been neither convenient nor economic, and when the situation has been plotted by means of flow-lines, the physical act of continuation has been complicated and tedious.

The problem has now been solved by the new Rotadate chart, latest addition to the Movigraph range. This enables a process or state to be charted over a current period.

Operation is simple. The system comprises a number of panels (the actual number is determined by the length of period required). These fit into two horizontal channelled wooden sections which are screwed to a wall. Each individual panel can be removed or inserted in a matter of seconds.



The new Rotadate chart, latest addition to the Movigraph range. The unit enables a process or state to be charted over a current period

When the period covered by the panel at the extreme left of the system has expired, that panel is removed. The remaining panels are then pushed towards the left—they slide easily along the channels—leaving a gap which is filled by a fresh panel representing a new period. The flow-lines are attached in such a way that they automatically adjust themselves. That portion of the chart which holds title-frames is separate and permanently fixed. The chart follows the usual Movigraph pattern in that the panels are perforated, and this factor enables various signals to be inserted in the perforations.

The Rotadate has many applications in industry, commerce, building and transport. Machine loading is one particular application which readily comes to mind.

FOAM IN FIGHTING COAL-MINE FIRES

Foam-producing substances similar to those used in household and commercial detergents and in bubble-bath formulas soon will be tested by the U.S. Bureau of Mines as aids in fighting coal-mine fires. This was disclosed recently by Dr. Irving Hartmann, chief of the Bureau's Branch of Dust Explosions, in a talk before the Western Kentucky Mining Institute.

The so-called foam-plug technique, involving detergents originated at England's Safety in Mines Research Establishment, Dr. Hartmann said. It promises a means of controlling the severe heat and flames of a coal-mine fire so that fire-fighters can move in and extinguish it.

The foam is generated by spraying a bubble-making solution on a cotton screen, or net, stretched across a mine passage. As the solution penetrates the net, large bubbles form and quickly fill the entire cross-section of the tunnel. This mass of foam is carried by the mine ventilating current to the fire zone, where the water in the foam vaporizes, reducing the oxygen and subduing the flames.

When fire starts in a coal mine, workers frequently are unable to get close enough to combat it effectively. If the foam-plug technique can overcome this obstacle, it will be a significant advance in mine safety. Tests to determine whether this novel method can be adapted to American mining conditions are scheduled to begin soon at the Bureau's Experimental Coal Mine near Bruceton, Pa. Portions of the mine are being modified for the research.

Closely related to the foam-plug experiment are several other Bureau projects, some already under way and some planned for the near future, Dr. Hartmann told the Kentucky meeting. Among these are ways of reducing explosion hazards by allaying coal dust at its source, research on methods of promoting agglomeration of dust particles and their adherence to mine rib and roof surfaces with specially developed adhesive binders, and further development of wet rock dusting to prevent spreading coal-mine explosions. Work also is planned on quenching mine gas explosions, and on measures for preventing ignition of gas by electric sparks, by frictional and impact sparks and by other sources.

Other news from the U.S. Bureau of Mines relates to the adoption of new standards under which the Bureau will test and approve devices for confining permissible explosives to boreholes in coal-mine blasting. The standards, which were approved recently, supersede those originally formulated several years ago.

The standards originally specified that only incombustible materials be employed in manufacturing permissible stemming devices. The new schedule allows for the use of flame-resistant materials and outlines rigid tests to which stemming plugs will be subjected.

Obituary

DR. P. D. MERICA

We regret to record the death on October 20 of Dr. Paul Dyer Merica. Born in Warsaw, Indiana, in 1889, Dr. Merica attended the De Pauw University from 1904 to 1907 and received an AB degree from the University of Wisconsin the following year. He received his Ph.D. from the University of Berlin in 1914 and from 1914 to 1919 was associated with the metallurgical division of the U.S. Bureau of Standards in Washington.

Dr. Merica first became associated with the International Nickel Co. of Canada, Ltd., in 1919, becoming director of research and subsequently assistant manager of the Development and Research Department. He became assistant to the president in 1932, a director in 1934, vice-president in 1936, executive vice-president in 1949, and president in May, 1952. He retired from the last position in April, 1954, but continued to serve the company on important projects and in the capacity of consultant.

Dr. Merica was long associated with research activities in Canada, the United Kingdom, and the United States, and had evolved numerous iron-nickel and copper-nickel alloys. He was an honorary member of the Institute of Mining and Metallurgical Engineers and of the American Society for Metals. He was a former vice-president and director of the Institute.

Publications Received

A complete re-survey of the geological occurrences of the country around Sheffield was instituted before World War II, The work was finally completed in 1953, the area covered being nearly all within the Yorkshire and East Midlands coalfield. The book, *Geology of the Country Around Sheffield*, completes the resurvey of the exposed Yorkshire section of the field and accomplishes the resurvey of over one-third of the exposed Derbyshire and Nottinghamshire area. The work, comprising 238 pages with illustrations, maps and index, is published by H.M.S.O. at 27s. 6d.

★

A well-indexed and comprehensive ready-reference for engineers engaged in planning or day-to-day operation of a ventilation system for tunnel-driving has recently been published by Flexible Ducting, Ltd. Attractively bound in stiff cloth covers, *Tunnel Ventilation* condenses most of the salient details dealing with ventilation only into twelve pages of facts and figures. A wide range of tunnel information is given.

★

A brochure published by British Resin Products, Ltd., informs shareholders more fully of the background and progress of the company's industrial enterprises. Beautifully illustrated in colour, *The Industrial Activities of the Distillers Co., Ltd.*, includes a section relating to the Distillers Plastics Group.

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Register of Fellows and Associates of the Royal Institute of Chemistry has been received. Comprising 556 pages, this register is applicable to the year ended October 31, 1956.

TEKKA, LTD.

MR. D. W. THOMAS'S STATEMENT

The thirty-seventh annual general meeting of Tekka, Ltd., was held on October 25 at the Registered Office, Redruth.

Mr. D. W. Thomas (Chairman) presided.

The Reports and Accounts for the year ended March 31, 1957, having been circulated for the prescribed time, were taken as read, as was also the Chairman's Statement, circulated with the Reports and Accounts, which was as follows :—

The accounts show a profit of £14,581 after payment to the Malayan Government of £12,393 as Royalty on Ore Sales and provision of £7,610 for United Kingdom and Malayan Taxation (less credit for Malayan Tax).

Three dividends totalling 1/- per share, absorbing a nett amount of £10,309 have been paid to Shareholders. The balance of £30,224 brought forward from the previous year has been slightly increased to £30,393 which the Directors propose to carry forward.

During the year under review two Capital Repayments have been made — the first of 5/- per share, and the second of 2/6d. per share. The shares are now of a nominal value of 12/6 each.

The Report of our General Managers, Messrs. Osborne and Chappel, circulated with the Accounts, gives particulars and comparative results at the Mine.

During the year 143.93 tons of tin-ore were recovered from 330,300 cubic yards of ground treated. This output was a little higher than that of the previous year, while the volume of ground treated was slightly less. The recovery per cubic yard was better at 0.97 lb., as against 0.92 lb. for the previous year. The price received for tin-ore was very little altered, but the cost per cubic yard at the Mine increased from 32.68 pence to 39.04 pence on account of the higher cost of labour, power, and the renewal of leases.

During the current financial year the output for the first five months was 75¼ tons of tin-ore, and in their report the General Managers state that it is anticipated that production will again be maintained at a level comparable with that of the year under review.

International Tin Agreement

The Agreement which became effective on July 1, 1956, provides for the calling up of the initial Buffer Stock contribution of 15,000 tons metal or its equivalent in cash. In March, 1957, the International Tin Council raised the floor price of tin metal from £640 to £730 per ton, retaining the ceiling price unchanged at £880. The Manager of the Buffer Stock may therefore now buy metal when the price ranges between £730 and £780 per ton, but may neither buy nor sell when the price is between £780 and £830 per ton. He may sell with the price at between £830 and £880 per ton. The raising of the floor price brings the price range more in accordance with existing conditions and it is hoped that the consequent alteration in the permissible buying level will enable the Buffer Stock Manager to purchase metal on the Market as and when it becomes necessary and so place him in a position to fulfil the functions for which the Buffer Stock was established.

Malaya is contributing to the Buffer Stock entirely in cash, which is being recovered by Government from individual producers by means of a cess on the Company's gross receipts from ore sales, the rate of cess varying according to the price of the metal. Your Company's compulsory payments, which commenced in October, 1956, totalled to March 31, 1957, £4,033. During the subsequent five months a further £3,500 approximately has been contributed. These contributions constitute a heavy drain on the proceeds of mining operations and represent an asset "frozen" until the liquidation or partial liquidation of the Buffer Stock.

Political

As I write these remarks the Federation of Malaya attains its independence within the Commonwealth. It is interesting to note the following remarks by the Chief Minister of the Federation made recently after formally dedicating the new Research Building of the Federation Department of Mines :

> "The continuance of mining as a flourishing industry is of the greatest importance to Malaya and the Alliance Government will do all it can to help it to flourish. Foreign Companies and capital should not be afraid as to their future, because the primary concern of the Government is the well-being of the industry. So whatever people, be they foreigners or Malayans, who aim to make mining their interest they will be helped along by the Government."

The Hon'ble Mr. J. T. Chappel, C.B.E., J.P., the senior partner of our General Managers, President of the F.M.S. Chamber of Mines, and a member of the Federal Legislative Council, recently stated at a Council Meeting :

> "The European section of the mining industry which is responsible for approximately 60 per cent of the country's production of tin ore, will continue to play its important part in the economy of Malaya after Merdeka. Many of us in the industry have spent our whole working lives in Malaya and fully identify ourselves with its continued prosperity. Whether or not we become Federal citizens, we should like still to think of ourselves as Malayans. The mining industry pledges itself to co-operate with the Government of the day in maintaining its efficiency and productive capacity, so as to continue to play its vital part in the economy of the country."

The Directors record their thanks to the General Managers and the Manager and Staff at the Mine and their appreciation of all loyal services rendered.

The Statement of Accounts and Balance Sheet, together with the Directors' Report, were received and adopted.

UNIVERSITY OF LONDON

A course of three lectures on (1) "The Economics of Modern Mining"; (2) "The Responsibilities of a Mining Industry to the Community"; (3) "The Development of the Copper Industry", will be delivered by Sir Ronald Prain at 5.30 p.m. on November 7, 14 and 26, at Imperial College of Science and Technology, Royal School of Mines, South Kensington, S.W.7.

ADMISSION FREE, WITHOUT TICKET.

JAMES HENDERSON,
Academic Registrar.